

## DIEGO FAZI

Mailing address: Solar Energy Conversion Group  
Chemical Sciences & Engineering Division  
Bldg 200, Room E105  
Argonne National Laboratory  
9700 South Cass Ave.  
Argonne IL 60439-4831

E-mail addresses: [dfazi@anl.gov](mailto:dfazi@anl.gov)

Office Number: 630-252-5796 Fax: 630-252-9289

Personal Pages: <http://faculty.wcas.northwestern.edu/diego-fazi/>  
<http://www.fazid.org>



## Research Interests

Diego Fazi comes from a theoretical Physics background and he performed research in gravitational-wave astronomy within the project LIGO from 2005 to 2012.

In October 2012 Dr. Fazi joined the CSE division at Argonne as a postdoctoral appointee in the Solar Conversion group lead by David Tiede.

Dr. Fazi's research involves applying computational methods used in gravitational-wave data analysis to the field of solar fuel catalysts characterization. In particular he uses Markov-Chain Monte Carlo techniques coupled with Pair Distribution Function analysis to compare experimental high-energy X-ray scattering data with theoretical models of water-splitting solar photo-catalysts, with the goal of characterizing the catalysts' molecular structure and improving the efficiency of hydrogen production from artificial photosynthesis.

## Education

**University of Bologna, Bologna (Italy) (In-residence at the California Institute of Technology)**

**Ph.D. in Physics.** Awarded on: April 28th 2009

Major: Theoretical Physics and Mathematical Methods.

Thesis subject: Gravitational Waves Data Analysis and General Relativity.

Dissertation Title: *"Development of a physical-template search for gravitational waves from spinning compact-object binaries with LIGO."*

**University of Bologna, Bologna (Italy)**

**M.S. (laurea) in Physics** – 110/110 Summa Cum Laude. Awarded on: March 12th 2004

Major: Nuclear and Subnuclear Physics.

Thesis subject: General Relativity and Quantum Field Theory.

Dissertation Title: *"Gravitational collapse of a radiating shell composed of charged bosonic matter"*  
(original title in Italian)

## Fellowships and Awards

- Grant for an allocation of 764,640 CPU hours on Northwestern's "Quest High Performance Computing System" as PI of a project for gravitational-wave data analysis and simulations (01/17/2012).
- Honorable mention for the 2009 GWIC Thesis Prize ([gwic.ligo.org/thesisprize/2009/](http://gwic.ligo.org/thesisprize/2009/))

- Italian Government Graduate Fellowship 2005-2008
- LIGO-Caltech fellowship 2005-2008
- Caltech-TAPIR fellowship 2008-2009

## Research Experience

### **Argonne National Laboratory and ANSER, Lemont, IL**

Post-doctoral Appointee in the Solar Conversion group, 2012 - present

- I use Markov-Chain Monte Carlo techniques coupled with Pair Distribution Function analysis to compare experimental high-energy X-ray scattering data with theoretical models of water-splitting solar photocatalysts, with the goal of characterizing the catalysts' molecular structure and improving the efficiency of hydrogen production from artificial photosynthesis.

### **LIGO Scientific Collaboration (LSC)**

Performed research as a member of the Laser Interferometer Gravitational-wave Observatory (LIGO) and LIGO Scientific Collaboration (LSC) at various institutions, 2005 - present

### **Northwestern University and CIERA, Evanston, IL**

Post-doctoral Fellow in Astrophysics, 2009 - 2012

- Developed a new data analysis strategy for the search of GWs emitted by stellar compact-object binaries, using matched-filtering techniques. Paper in preparation (see publications)
- Contributed developing a Markov Chain - Monte Carlo (MCMC) Bayesian code for parameter estimation of astrophysical GW sources

### **California Institute of Technology, Pasadena, CA**

Post-doctoral fellow in Physics, July-August 2009

Visitor in Physics, 2005-2009

- Studied, developed and implemented all the code for a new search of GWs emitted by spinning compact-object binaries using precessing GW templates

### **University of Bologna, Bologna (Italy)**

MS and PhD student, 2003-2005

- Studied the gravitational collapse of self-gravitating bodies in curved space-times and the associated quantum-mechanical radiation emission. Subject of my MS thesis.
- Results following this study lead also to the publication of a paper (see publications)

## Publications

### **MS Thesis:**

- “Collasso gravitazionale di un guscio radiante di materia bosonica elettricamente carica” (Gravitational collapse of a radiating shell of electrically charged bosonic matter)

By D. Fazi

Laurea (MS) thesis, University of Bologna (2004), ([http://faculty.wcas.northwestern.edu/diego-fazi/documents/thesis\\_laurea.pdf](http://faculty.wcas.northwestern.edu/diego-fazi/documents/thesis_laurea.pdf))

**PhD Thesis:**

- “Development of a physical-template search for gravitational waves from spinning compact-object binaries with LIGO”

By D. Fazi

PhD thesis, University of Bologna (2009), ([http://faculty.wcas.northwestern.edu/diego-fazi/documents/PhD\\_thesis.pdf](http://faculty.wcas.northwestern.edu/diego-fazi/documents/PhD_thesis.pdf))

**Papers in preparation:**

- “Physical Templates in the search for gravitational waves from spinning compact-object binaries with ground based interferometers”

By D. Brown, Y. Chen, D. Fazi, M. Vallisneri  
in preparation

- “Evidence for Spin in Compact Binary Coalescence: when can we trust it ?”

Raymond, V., Aylott, B., Farr, B., Farr, W., Fazi, D., Kalogera, V., Mandel, I., Röver, C., Veitch, J., in preparation

**Selected refereed Journal Articles (total 59) :**

- “Classical dynamics and stability of collapsing thick shells of matter”

By G.L. Alberghi, R. Casadio, D. Fazi.

gr-qc/0601062.

Class.Quant.Grav. 23 (2006) 1493-1506.

- “Search for Gravitational Waves from Low Mass Compact Binary Coalescence in 186 Days of LIGO's fifth Science Run”

By LIGO Scientific Collaboration (B.P. Abbott et al.).

arXiv:0905.3710 [gr-qc].

Phys.Rev. D80 (2009) 047101.

- “Search for Gravitational Waves from Compact Binary Coalescence in LIGO and Virgo Data from S5 and VSR1”

By LIGO Scientific and Virgo Collaborations (J. Abadie et al.).

arXiv:1005.4655 [gr-qc].

Phys.Rev. D82 (2010) 102001.

- “Search for gravitational waves associated with gamma-ray bursts during LIGO science run 6 and Virgo science runs 2 and 3”

By LIGO Scientific Collaboration (J. Abadie et al.).

arXiv:1205.2216 [astro-ph.HE].

10.1088/0004-637X/760/1/12.

Astrophys.J. 760 (2012) 12.